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Text-book of Comparative Geology. By E. KAYSER, Ph.D. Translated and edited by PHILIP LAKE. Pp. xii, 426. Swan, Sonnenschein & Co., London. (Macmillan).

The translation of Dr. Kayser's book is a welcome addition to the literature of geology in English. Its title is fairly definitive. It is an attempt to bring together, or to set in their proper relations, the results of geological investigation conducted in the various parts of the world. The volume is too brief to allow this to be carried out in great detail. The abbreviation has been effected in part by the omission, or by no more than the merest mention, of results reached in extra-European countries. This is particularly true with that part of the volume which deals with the post-Paleozoic formations. While at first thought this might seem to detract from the value of the volume for American students, we think on the whole it is an advantage instead, if omissions were necessary. Data concerning American geology are more easily accessible to American students than data concerning European geology, which this volume measurably supplies. The volume will find its chief use in America as a convenient reference book of European geology, and as such it should be widely distributed. Its abundance of tables, showing the relations of the subdivisions of the various systems in different countries, so far as they are made out, are especially convenient for general reference.

At several points in the volume there is a noticeable tendency to make unqualified statements where qualified statements would seem to us better. A case in point is the unqualified denial of the organic character of the Eozoon. It is true in most cases, where positive conclusions are asserted, that they represent the best conclusions of the present day, but in some cases they seem to us to represent probable or qualified or tentative conclusions, not demonstrated or absolute or final ones.

All pre-Cambrian rocks are represented as Archean, though the length of Archean time is stated to be so great that the beginning of the Cambrian "may be considered as comparatively a recent event." In spite of this recognition of the importance of the Archean, but fourteen pages are devoted to its consideration. Although different systems are not recognized in the pre-Cambrian rocks, the diversity of origin of different parts of the group is distinctly recognized. The author is inclined to attach less weight to the existence of limestone and graphite in the Archean rocks, as indications of life, than would

most geologists. He thinks that the strongest evidence for the existence of life in pre-Cambrian time is the high organization of the Cambrian fauna. While geologists will be ready to assent to the strength of this last argument, they will hardly be ready to regard it as the only strong reason for belief in pre-Cambrian life. To the very considerable number of fossil forms already found in pre-Cambrian rocks no reference is made.

The important question of the origin of the Archean is rather briefly dismissed. The discussion touching this question is much less full and much less satisfactory than that of Prof. Van Hise, recently published.¹ Indeed, had Prof. Van Hise's discussion been published before Dr. Kayser's treatise, the latter author might have found a way out of some of the difficulties which seem to lie in his mind concerning the origin of the Archean.

An excellent feature of the book is the prefacing of the discussion of each system by a short account of the origin and history of its differentiation from underlying and overlying systems. Each system is discussed under the general heads of — 1) Distribution and development; 2) Paleontology. Under the first head, it could have been wished that the structural relations of the systems had been more uniformly and sharply brought out. Such clear statements as that concerning the North American Devonian system, that it rests "conformably and without break on the Silurian, and is covered conformably by the Carboniferous" (page 111), are not always to be found. Where knowledge does not permit such positive statements, definite statements representing the degree of present knowledge would have been welcome. So, too, the relations of faunal and stratigraphical breaks are not always so clearly set forth as could have been desired in a text-book.

In the discussion of the Permian system, Dr. Kayser brings out the fact of wide-spread conglomerate formations (India, Victoria, Brazil, South Africa) in tropical latitudes and the southern hemisphere, which sometimes contain polished and striated stones very like those of glacial formations of later date. In Africa the Dwyka conglomerate rests on rock, the upper surface of which is smoothed and striated like rock beneath the modern glacial drift. Dr. Kayser indicates that the belief that these Permian conglomerate beds are of glacial origin has gradually gained ground. The flora succeeding the conglomer-

¹ Bulletin of the U. S. Geol. Survey, No. 86.

ate in Africa, South Asia and Australia is characterized by Mesozoic types. This change is believed by many to have been brought about by the cold climate which was the determining cause of the conglomerate beds. Blanford and Waagen go further and connect the decline of the marine Paleozoic types with the cold climate of the end of the Paleozoic.

In the discussion of the Mesozoic and Neozoic there is scarcely any reference to American geology. In connection with the discussion of Pleistocene geology, two glacial epochs are recognized. The author inclines to the eolian hypothesis for the origin of loess.

Both the physical and paleontological phases of the subjects discussed in the volume are illustrated by numerous figures, the former rather less fully than the latter. A series of maps, showing the distribution and relations of the systems described, would have enhanced the value of the volume which is still great without them.

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Iowa Geological Survey. Vol. I. First Annual Report, 1892. SAMUEL CALVIN, State Geologist, Des Moines, 1893. 8vo, 472 pp., 10 plates and 26 figures.

IN addition to brief administrative reports, the first report of Iowa's third survey contains papers by S. Calvin, C. R. Keyes, Assistant State Geologist, S. W. Beyer, H. F. Bain and G. L. Houser.

The introductory paper by Mr. Keyes, on the Geological Formations of Iowa, is a summary of present knowledge of the various formations occurring within the limits of the state. The writer has availed himself of the various studies made of these rocks in recent years, and the result is shown in an improved classification over that of preceding surveys. While all the formations have come under careful study, the most notable progress is shown to have been made in the classification of the Devonian, the Carboniferous and the Cretaceous.

Investigations in northwestern Iowa have brought to light the presence of undoubted eruptive rocks at no great depth below the surface. In Mr. Beyer's paper are given the details relating to the discovery of typical quartz-prophyry, interbedded with sandstone and gravel, in a deep well at Hull, Iowa. The discovery by Culver and Hobbs of eruptive rock within the Sioux quartzite in southeastern